

Claims

1. An apparatus for generating one or more audio output channels, wherein the apparatus comprises:

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a parameter processor ~~(110)~~ for calculating output channel mixing information, and

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a downmix processor ~~(120)~~ for generating the one or more audio output channels, wherein the downmix processor ~~(120)~~ is configured to receive an audio transport signal comprising one or more audio transport channels, wherein two or more audio object signals are mixed within the audio transport signal, and wherein the number of the one or more audio transport channels is smaller than the number of the two or more audio object signals,

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wherein the audio transport signal depends on a first mixing rule and on a second mixing rule, wherein the first mixing rule indicates how to mix the two or more audio object signals to obtain a plurality of premixed channels, and wherein the second mixing rule indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal,

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wherein the parameter processor ~~(110)~~ is configured to receive information on the second mixing rule, wherein the information on the second mixing rule indicates how to mix the plurality of premixed signals such that the one or more audio transport channels are obtained,

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wherein the parameter processor ~~(110)~~ is configured to calculate the output channel mixing information depending on an audio objects number indicating the number of the two or more audio object signals, depending on a premixed channels number indicating the number of the plurality of premixed channels, and depending on the information on the second mixing rule, and

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wherein the downmix processor ~~(120)~~ is configured to generate the one or more audio output channels from the audio transport signal depending on the output channel mixing information.

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2. An apparatus according to claim 1, wherein the apparatus is configured to receive at least one of the audio objects number and the premixed channels number.

3. An apparatus according to claim 1 or 2,

wherein the parameter processor ~~(110)~~ is configured to determine, depending on the audio objects number and depending on the premixed channels number, information on the first mixing rule, such that the information on the first mixing rule indicates how to mix the two or more audio object signals to obtain the plurality of premixed channels, and

wherein the parameter processor ~~(110)~~ is configured to calculate the output channel mixing information, depending on the information on the first mixing rule and depending on the information on the second mixing rule.

4. An apparatus according to claim 3,

wherein the parameter processor ~~(110)~~ is configured to determine, depending on the audio objects number and depending on the premixed channels number, a plurality of coefficients of a first matrix ~~(P)~~ as the information on the first mixing rule, wherein the first matrix ~~(P)~~ indicates how to mix the two or more audio object signals to obtain the plurality of premixed channels,

wherein the parameter processor ~~(110)~~ is configured to receive a plurality of coefficients of a second matrix ~~(Q)~~ as the information on the second mixing rule, wherein the second matrix ~~(Q)~~ indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal, and

wherein the parameter processor ~~(110)~~ is configured to calculate the output channel mixing information depending on the first matrix ~~(P)~~ and depending on the second matrix ~~(Q)~~.

5. An apparatus according to claim 1 or 2,

wherein the parameter processor ~~(110)~~ is configured to receive metadata information comprising position information for each of the two or more audio object signals,

wherein the parameter processor ~~(110)~~ is configured to determine information on the first mixing rule depending on the position information of each of the two or more audio object signals.

- 5 6. An apparatus according to claim 3 or 4,

wherein the parameter processor ~~(110)~~ is configured to receive metadata information comprising position information for each of the two or more audio object signals,

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wherein the parameter processor ~~(110)~~ is configured to determine the information on the first mixing rule depending on the position information of each of the two or more audio object signals.

- 15 7. An apparatus according to claim 5 or 6,

wherein the parameter processor ~~(110)~~ is configured to determine rendering information depending on the position information of each of the two or more audio object signals, and

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wherein the parameter processor ~~(110)~~ is configured to calculate the output channel mixing information depending on the audio objects number, depending on the premixed channels number, depending on the information on the second mixing rule, and depending on the rendering information.

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8. An apparatus according to one of the preceding claims,

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wherein the parameter processor ~~(110)~~ is configured to receive covariance information indicating an object level difference for each of the two or more audio object signals, and

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wherein the parameter processor ~~(110)~~ is configured to calculate the output channel mixing information depending on the audio objects number, depending on the premixed channels number, depending on the information on the second mixing rule, and depending on the covariance information.

9. An apparatus according to claim 8,

wherein the covariance information further indicates at least one inter object correlation between one of the two or more audio object signals and another one of the two or more audio object signals, and

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wherein the parameter processor ~~(110)~~ is configured to calculate the output channel mixing information depending on the audio objects number, depending on the premixed channels number, depending on the information on the second mixing rule, depending on the object level difference of each of the two or more

10 audio object signals and depending on the at least one inter object correlation between one of the two or more audio object signals and another one of the two or more audio object signals.

10. An apparatus for generating an audio transport signal comprising one or more
- 15 audio transport channels, wherein the apparatus comprises:

an object mixer ~~(210)~~ for generating the audio transport signal comprising the one or more audio transport channels from two or more audio object signals, such that the two or more audio object signals are mixed within the audio transport signal, and wherein the number of the one or more audio transport channels is smaller

20 than the number of the two or more audio object signals, and

an output interface ~~(220)~~ for outputting the audio transport signal, wherein the apparatus is configured to transmit the audio transport signal to a decoder,

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wherein the object mixer ~~(210)~~ is configured to generate the one or more audio transport channels of the audio transport signal depending on a first mixing rule and depending on a second mixing rule, wherein the first mixing rule indicates how to mix the two or more audio object signals to obtain a plurality of premixed

30 channels, and wherein the second mixing rule indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal,

wherein the first mixing rule depends on an audio objects number, indicating the number of the two or more audio object signals, and depends on a premixed

35 channels number, indicating the number of the plurality of premixed channels, and wherein the second mixing rule depends on the premixed channels number, and

wherein object mixer ~~(210)~~ is configured to generate the one or more audio transport channels of the audio transport signal depending on a first matrix ~~(P)~~, wherein the first matrix ~~(P)~~ indicates how to mix the two or more audio object signals to obtain the plurality of premixed channels, and depending on a second matrix ~~(Q)~~, wherein the second matrix ~~(Q)~~ indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal,

wherein first coefficients of the first matrix ~~(P)~~ indicate information on the first mixing rule, and wherein second coefficients of the second matrix ~~(Q)~~ indicate information on the second mixing rule,

wherein the apparatus is configured to transmit the second coefficients of the second mixing matrix ~~(Q)~~ to the decoder, and wherein the apparatus is configured to not transmit the first coefficients of the first mixing matrix ~~(P)~~ to the decoder.

11. An apparatus according to claim 10,

wherein the object mixer ~~(210)~~ is configured to receive position information for each of the two or more audio object signals, and

wherein the object mixer ~~(210)~~ is configured to determine the first mixing rule depending on the position information of each of the two or more audio object signals.

12. A system, comprising:

an apparatus ~~(310)~~ according to claim 10 or 11 for generating an audio transport signal, and

an apparatus ~~(320)~~ according to one of claims 1 to 9 for generating one or more audio output channels,

wherein the apparatus ~~(320)~~ according to one of claims 1 to 9 is configured to receive the audio transport signal and information on the second mixing rule from the apparatus ~~(310)~~ according to claim 10 or 11, and

wherein the apparatus ~~(320)~~ according to one of claims 1 to 9 is configured to generate the one or more audio output channels from the audio transport signal depending on the information on the second mixing rule.

- 5 13. A method for generating one or more audio output channels, wherein the method comprises:

10 receiving an audio transport signal comprising one or more audio transport channels, wherein two or more audio object signals are mixed within the audio transport signal, and wherein the number of the one or more audio transport channels is smaller than the number of the two or more audio object signals, wherein the audio transport signal depends on a first mixing rule and on a second mixing rule, wherein the first mixing rule indicates how to mix the two or more audio object signals to obtain a plurality of premixed channels, and wherein the
15 second mixing rule indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal,

20 receiving information on the second mixing rule, wherein the information on the second mixing rule indicates how to mix the plurality of premixed signals such that the one or more audio transport channels are obtained,

25 calculating output channel mixing information depending on an audio objects number indicating the number of the two or more audio object signals, depending on a premixed channels number indicating the number of the plurality of premixed channels, and depending on the information on the second mixing rule, and

generating one or more audio output channels from the audio transport signal depending on the output channel mixing information.

- 30 14. A method for generating an audio transport signal comprising one or more audio transport channels, wherein the method comprises:

generating the audio transport signal comprising the one or more audio transport channels from two or more audio object signals,

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outputting the audio transport signal, and transmitting the audio transport signal to a decoder, and

transmitting second coefficients of a second mixing matrix (~~Q~~) to the decoder, and not transmitting first coefficients of a first mixing matrix (~~P~~) to the decoder,

wherein generating the audio transport signal comprising the one or more audio transport channels from two or more audio object signals is conducted such that the two or more audio object signals are mixed within the audio transport signal, wherein the number of the one or more audio transport channels is smaller than the number of the two or more audio object signals, and

wherein generating the one or more audio transport channels of the audio transport signal is conducted depending on a first mixing rule and depending on a second mixing rule, wherein the first mixing rule indicates how to mix the two or more audio object signals to obtain a plurality of premixed channels, and wherein the second mixing rule indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal, wherein the first mixing rule depends on an audio objects number, indicating the number of the two or more audio object signals, and depends on a premixed channels number, indicating the number of the plurality of premixed channels, and wherein the second mixing rule depends on the premixed channels number,

wherein generating the one or more audio transport channels of the audio transport signal depending on the first matrix (~~P~~), wherein the first matrix (~~P~~) indicates how to mix the two or more audio object signals to obtain the plurality of premixed channels, and depending on the second matrix (~~Q~~), wherein the second matrix (~~Q~~) indicates how to mix the plurality of premixed channels to obtain the one or more audio transport channels of the audio transport signal,

wherein the first coefficients of the first matrix (~~P~~) indicate information on the first mixing rule, and wherein the second coefficients of the second matrix (~~Q~~) indicate information on the second mixing rule.

15. A computer program for implementing the method of claim 13 or 14 when being executed on a computer or signal processor.